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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,980	02/21/2006	Yasumasa Fujioka	127112	8848

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EXAMINER	
RALIS, STEPHEN J	

ART UNIT	PAPER NUMBER
3742	

MAIL DATE	DELIVERY MODE
05/29/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/568,980	FUJIOKA ET AL.	
	Examiner	Art Unit	
	Stephen J. Ralis	3742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 February 2006 and 18 January 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/13/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Applicant is respectfully requested to provide a location within the disclosure to support any further amendments to the claims due to when filing an amendment an applicant should show support in the original disclosure for new or amended claims. See MPEP § 714.02 and § 2163.06 ("Applicant should specifically point out the support for any amendments made to the disclosure.").

Response to Amendment/Arguments

3. Examiner accepts amendments to the Drawings and Specification and respectfully withdraws the objections, accordingly.

4. Applicant's arguments filed 18 January 2008 have been fully considered but they are not persuasive as set forth below:

5. NOTE - for further clarification, the examiner has included a better equivalency of mathematical term(s)/relationship(s) by using a variable "y", not in the instant application, for the thickness disclosed by Nelson et al.. Also the examiner inadvertently provided the wrong mathematical equivalency relationship(s) due to the confusion of variable "c" between the prior art of Nelson et al. and the instant application, however, the mathematical equivalency relationship(s) of Nelson et al. still anticipates the instant application, therefore, the rejection is maintained and the equivalency relationship(s) have been rectified.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

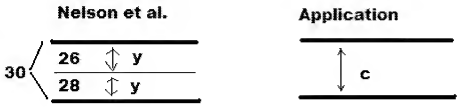
> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-3, 5-7 and 10 are rejected under 35 U.S.C. 102(a) and (e) as being anticipated by Nelson et al. (U.S. Publication No. 2002/0131918).

Nelson et al. disclose a plasma generating electrode (a double dielectric barrier edge-connected reactor element (54; page 4, paragraph 45, Figure 9) comprising at least two opposing plate-shaped unit electrodes (electrode plates 26, 28), each having a rectangular surface and four end faces (see Figures 5, 6), and a holding member (edge connector 10), which holds a fixed end of a first pair of parallel ends end faces (edges 41) of the unit electrode (electrode plates 26, 28) in a state in which the unit electrodes (electrode plates 26, 28) are separated at a specific interval (see Figures 3, 9), and is capable of generating plasma upon application of voltage between the unit electrodes (Abstract; page 2, paragraph 15-16; whole document), at least one of the opposing unit electrodes being a conductive-film-containing electrode including a ceramic body as a dielectric and a conductive film disposed inside the ceramic body (page 4, paragraphs 45-47; see Figures 4-6, 9), and a distance "a" (distance 35; page 3-4, paragraphs 40-

42; Figures 4-6) from an edge of the conductive film to an edge of the ceramic body on a second pair of parallel end faces (edges 37) of the conductive- film-containing electrode adjacent to the first pair of parallel end faces (edges 41) and a thickness "c" (thickness 25 – or "y" defined below; page 3-4, paragraphs 40-42; Figures 4-6). Nelson et al. further disclose the thickness, "c", (25) being in the range 0.38 millimeters to about 1 millimeter, *preferably 0.5 millimeters* (page 3, paragraph 40), and the distance, "a", being large relative to the width (13) of the tines (12),which is in the range of 0.5 millimeters to about 2.0 millimeters, preferably about 0.9 millimeters.

With respect to the limitation of satisfying a relationship of "$(c/2) \leq a \leq 5c$", Nelson disclose an embodiment with two dielectric plates (26, 28) being on either side of the conductive electrode ink (30) (see Figure 9). Nelson further discloses the dielectric plates (26, 28) as being prepared from dielectric plate (24) having a width/thickness (25) of about 0.38 millimeters to about 1 millimeter, *preferably 0.5 millimeters* (page 3, paragraph 40; see Figure 4). Since Nelson et al. disclose each plate half (26,28 of combination plate 30) having a thickness (25) of *preferably 0.5 millimeters* (page 3, paragraph 40) and the thickness of the dielectric plate of the instant application is "c" as disclosed in Figure 2, the below mathematical equivalency may be made:



2y = c

Therefore, the thickness of the electrode plate (24,26, 28) would be the thickness of the dielectric plate, "y", (*preferably 0.5 millimeters*) multiplied by two or "c = 2*y". For mathematical simplification, the recited relationship may be simplified to recite "$y \leq a \leq 10y$" with the thickness "c" actually being "2 * y" since the electrode (30) is inside two dielectric plates (26, 28). Therefore, (preferably 0.5 millimeters to 1 millimeter) ≤ (0.5 to 2 millimeters) ≤ 10*(*preferably 0.5 millimeters to 1 millimeter*) fully meets "$(c/2) \leq a \leq 5c$" given its broadest reasonable interpretation.

With respect to the limitations of claim 2, Nelson et al. disclose a distance "b" (small setback 39) as being about 5 millimeter (page 4, paragraph 4; see Figures 5, 6). As noted previously, the thickness "c" is actually "2 * y" since the electrode (30) is inside two dielectric plates (26, 28). Therefore, the relationship, "$2c \leq b \leq 10c$", with respect to Nelson et al. is "$4y \leq b \leq 20y$" or 4*(preferably 0.5 millimeters to 1 millimeter) ≤ (about 5 millimeters) ≤ 10*(2*(preferably 0.55 millimeter to 1 millimeters) fully meets "$2c \leq b \leq 10c$" given its broadest reasonable interpretation.

With respect to the limitations of claim 3, Nelson et al. disclose a distance "d" (small setback 39) as being about 5 millimeters (page 4, paragraph 4; see Figures 5, 6). Furthermore, Nelson recites a preferred thickness of "y" being preferably 0.5 millimeters

to 1 millimeter and the preferred distance "d" being about 5 millimeters. Therefore, the relationship, "c/2 ≤ d ≤ 5c", with respect to Nelson et al. is "y ≤ d ≤ 10y" or (0.5 millimeters preferred to 1 millimeter) ≤ (about 5 millimeters) ≤ 10*(0.5 millimeters preferred to 1 millimeter)) fully meets ""(c/2) ≤ d ≤ 5c" given its broadest reasonable interpretation.

With respect to the limitation of claim 5, Nelson et al. disclose the holding member (edge connector 10) being a made of dielectric materials not limited to but including alumina, cordierite or mullite (page 3, paragraph 34). Nelson et al. further discloses the barrier electrode plates (24, 26, 28) being dielectric barrier plates (page 3-4, paragraphs 40-42, 45-47). Therefore since Nelson et al. disclose alumina or mullite being the preferred material for use as the dielectric material, the Nelson et al. dielectric electrode plates would be inherently made of the same material since it is preferred.

With respect to the limitation of claim 6, Nelson et al. disclose the electrode being made of materials such as silver or platinum (page 5, paragraph 50).

With respect to the limitations of claim 7, Nelson et al. disclose a plasma reactor (44) that would inherently have a casing holding the reactor element (54) or the exhaust steam (74) gas would not be constricted to the reactor (44) with the gas passage (exhaust stream 74) being introduced into the reactor (44) with the inherent casing and flowing through the plasma generated by the electrode structure Abstract; page 2, paragraph 15-16; page 5, paragraph 55).

With respect to the limitations of claim 10, the dielectric material of interest being ceramics of alumina, cordierite or mullite, as noted above. These ceramic material are

considered dense material and the conductive film (electrode 30) being sandwiched between the dielectric/ceramic material plates (26, 28). Therefore, Nelson et al. fully meets "the ceramic body is a dense ceramic and the ceramic body and the conductive film are integrated" Given its broadest reasonable interpretation.

Nelson et al. further disclose high frequency AC electrical energy being provided from a source (70).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. (U.S. Publication No. 2002/0131918).

To the degree it can be argued that Nelson et al. do not teach the ceramic body including at least one ceramic selected from the group consisting of alumina, mullite,

ceramic glass, zirconia, cordierite, silicon nitride, aluminum nitride, and glass, Nelson is applied to itself as set forth:

Nelson et al. disclose the holding member (edge connector 10) being a made of dielectric materials not limited to but including alumina, cordierite or mullite (page 3, paragraph 34). Nelson et al. further discloses the barrier electrode plates (24, 26, 28) being dielectric barrier plates (page 3-4, paragraphs 40-42, 45-47). Nelson et al. teach that alumina, cordierite and mullite is recognized by those of ordinary skill in the art to be a ceramic material suitable for a dielectric material in a plasma generating electrode in a plasma reactor. Therefore, it would have been obvious to modify Nelson et al. with the teaching within itself to include alumina, cordierite or mullite as the dielectric material since it has been found that alumina, cordierite and mullite are art recognized equivalent dielectric material in plasma generating electrode structures within plasma reactors.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. (U.S. Publication No. 2002/0131918) in view of Kellogg et al. (U.S. Publication No. 2002/0027133).

Nelson et al. disclose all of the limitations of the claimed invention, as previously set forth, except for the conductive film has a thickness of 5 to 30 μm.

However, applying a resistive conductive film/ink having a thickness of 5 to 30 μm is known in the art. Kellogg et al. specifically teach a known technique of screen printing conductive inks to a thickness of about 10 microns (page 17, paragraph 194).

Kellogg et al. Kellogg et al. teach that screen printing conductive inks to a thickness of about 10 micron is recognized by those of ordinary skill in the art of providing conductive layers. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the conductive ink of Nelson et al. with the known technique and resulting micron thickness of Kellogg et al. to improve the device and yield predictable results.

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. (U.S. Publication No. 2002/0131918) in view of Hemingway et al. (U.S. Patent No. 6,423,190).

Nelson et al. disclose all of the limitations of the claimed invention, as previously set forth, except for the power source being a pulsed power supply for applying voltage to the plasma generating electrode.

However, a pulsed power source for applying voltage to a plasma generating electrode is known in the art. Hemingway et al. teach the usage of modulating a carrier frequency to provide pulses at a given interval in order to provide optimal energy transfer to the exhaust gas (page 2, line 50 – page 3, line 8). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the AC high frequency electrical power supply with the pulsed power modulation power supply method of Hemingway in order to provide optimal energy transfer to the exhaust gas, thereby improving the efficiency of the plasma reactor.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al. (U.S. Publication No. 2002/0131918) in view of Hemingway et al. (U.S. Patent No. 6,423,190) as applied to claim 8 above, and further in view of Okubo et al. (U.S. Publication No. 2005/0229564).

The Nelson-Hemingway combination discloses all of the limitations, as previously set forth, except for the pulsed power supply including at least one SI thyristor.

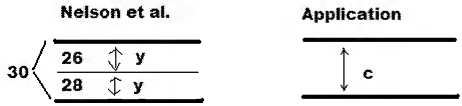
However, a plasma generation device for exhaust gas treatment utilizing a pulsed power supply including at least one SI thyristor is known in the art. Okubo et al. teach a plasma generation device utilizing a high voltage pulse power source including an SI thyristor as a switching element to provide a maximum voltage of about 45kV at a rated load and a frequency that can be changed within the range of 80 to 500 Hz. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the Nelson-Hemingway combination with the pulsed power supply including an SI thyristor of Okubo et al. in order to provide a maximum voltage of about 45kV at a rated load and a frequency that can be changed within the range of 80 to 500 Hz. Furthermore, it would have been obvious to modify the Nelson-Hemingway combination with the pulsed power supply including an SI thyristor of Okubo et al. since it has been found tat a pulsed power supply with an SI thyristor is an art recognized equivalent of a pulsed power supply in plasma generating electrode structures within plasma reactors.

Remarks

14. With respect to applicant's argument that Nelson et al. do not teach at least a distance "a" from an edge of the conductive film to an edge of the ceramic body on a second pair of parallel end faces of the conductive-film- containing electrode adjacent to the first pair of parallel end faces and a thickness "c" of the ceramic body satisfying a relationship "(c/2) $\leq$ a $\leq$5c", the examiner respectfully disagrees. Applicant has inadvertently misinterpreted "a first end of a first pair of parallel end faces" and "a second pair of parallel faces" of Nelson et al. Nelson et al. disclose the "first end of a first pair of parallel end faces" being the edges (41) that have the terminal connection leads (32, 34) for connection to the ground bus paths (40, 42). Clearly, Nelson discloses the edges (41) as the "first end of a first pair of parallel end faces" having small setback (39) and the edges would be fixed in the ground bus paths (40, 42) or the device would not function accordingly. Nelson et al. further disclose the "second pair of parallel faces" (edges 37) being adjacent the edges (41) and having a distance (35) comparable to width (13) of the tines (12) which is in the range of 0.5 millimeter to about 2.0 millimeters, preferably about 0.9 millimeter (page 3-4, paragraph 41). Clearly, the distance (35) is relative to the edge (37), or the "second pair of parallel faces", therefore, the distance "a" correlates to the distance (35) of the edge (37), or the "second pair of parallel faces".

Furthermore, with respect to the limitation of satisfying a relationship of "(c/2) $\leq$ a $\leq$ 5c", Nelson disclose an embodiment with two dielectric plates (26, 28) being on either side of the conductive electrode ink (30) (see Figure 9). Nelson further discloses the

dielectric plates (26, 28) as being prepared from dielectric plate (24) having a width/thickness (25) of about 0.38 millimeters to about 1 millimeter, *preferably 0.5 millimeters* (page 3, paragraph 40; see Figure 4). Since Nelson et al. disclose each plate half (26, 28 of combination plate 30) having a thickness (25) of *preferably 0.5 millimeters* (page 3, paragraph 40) and the thickness of the dielectric plate of the instant application is "c" as disclosed in Figure 2, the below mathematical equivalency may be made:



2y = c

Therefore, the thickness of the electrode plate (24, 26, 28) would be the thickness of the dielectric plate, "y", (*preferably 0.5 millimeters*) multiplied by two or "c = 2*y". For mathematical simplification, the recited relationship may be simplified to recite "$y \leq a \leq 10y$" with the thickness "c" actually being "2 * y" since the electrode (30) is inside two dielectric plates (26, 28). Therefore, (preferably 0.5 millimeters to 1 millimeter) ≤ (0.5 to 2 millimeters) ≤ 10*(*preferably 0.5 millimeters to 1 millimeter*) fully meets "$(c/2) \leq a \leq 5c$" given its broadest reasonable interpretation. NOTE: the further relative distance relationship(s) equivalencies are defined above.

15. With respect to applicant's argument that Nelson does not contemplate the benefits of relative distances, the examiner respectfully disagrees. Nelson et al. disclose

relative distances (see Figures 4-6). Nelson et al. also disclose a distance "a", distance (35), being large relative to the width (13) of the tines (12) or 0.5 to 2 millimeters. The examiner notes that the distance being "*large relative to* the width 13 of tines 12…." is deemed very broad and if the width (13) of the tines (12) is, for example, 0.5 millimeters, that the distance being 0.7 millimeters would be considered large relatively speaking. Therefore, Nelson et al. does contemplate the benefits of the relative distances of the recited claims and the examiner maintains the rejection above.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Ralis whose telephone number is 571-272-6227. The examiner can normally be reached on Monday - Friday, 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tu Hoang can be reached on 571-272-4780. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Stephen J Ralis/
Examiner, Art Unit 3742

/TU B HOANG/
Supervisory Patent Examiner, Art Unit 3742

Stephen J Ralis
Examiner
Art Unit 3742

SJR
May 19, 2008